Name:

at1124exam: Radicals and Squares (v924)

Question 1

Simplify the radical expressions.

$\sqrt{63}$ $\sqrt{27}$ $\sqrt{20}$

$\sqrt{3 \cdot 3 \cdot 7}$ $\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{2 \cdot 2 \cdot 5}$

$3\sqrt{7}$ $3\sqrt{3}$ $2\sqrt{5}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-8)^2+10}{5} = 7$$

First, multiply both sides by 5.

$$(x-8)^2+10 = 35$$

Then, subtract 10 from both sides.

$$(x-8)^2 = 25$$

Undo the squaring. Remember the plus-minus symbol.

$$x-8 = \pm 5$$

Add 8 to both sides.

$$x = 8 \pm 5$$

So the two solutions are $x = 13$ and $x = 3$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 6x = 7$$

$$x^2 + 6x + 9 = 7 + 9$$
$$x^2 + 6x + 9 = 16$$
$$(x+3)^2 = 16$$
$$x + 3 = \pm 4$$
$$x = -3 \pm 4$$
$$x = 1 \quad \text{or} \quad x = -7$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 2x^2 - 16x + 23$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 - 8x) + 23$$

We want a perfect square. Halve -8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 - 8x + 16 - 16) + 23$$

Factor the perfect-square trinomial.

$$y = 2((x-4)^2 - 16) + 23$$

Distribute the 2.

$$y = 2(x-4)^2 - 32 + 23$$

Combine the constants to get **vertex form**:

$$y = 2(x-4)^2 - 9$$

The vertex is at point $(4, -9)$.